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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/526,047	07/28/2005	Akihisa Tomita	26607US2X PCT	2952
22850 7590 02/01/2008 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER CHAPEL, DEREK S	
			ART UNIT 2872	PAPER NUMBER
			NOTIFICATION DATE 02/01/2008	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary

Application No.

10/526,047

Applicant(s)

TOMITA, AKIHISA

Examiner

Derek S. Chapel

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2/28/05 & 7/28/05.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☒ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 February 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>2/28/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status Of Claims

1. Claims 1-5 are pending for examination as interpreted by the examiner.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The Information Disclosure Statement(s) (IDS) filed on 2/28/2005 was considered.

Drawings

4. The drawings were received on 2/28/2005. These drawings are accepted.

Specification

5. The abstract of the disclosure is objected to because in the first line of the abstract, "The present invention realizes a quantum circuit" should be changed to --A quantum circuit--. Correction is required. See MPEP § 608.01(b).
6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Claim Objections

7. Claims 1-4 are objected to because of the following informalities: claim 1 recites the limitations "the polarization directions", "the amount of polarization rotation", "the amount of phase difference", "the measurement of polarization" and "the preceding input light pulse sequence" throughout the claim. There is insufficient antecedent basis for this limitation in the claim. Claims 2-4 are objected to for inheriting the same informalities through their dependency from claim 1.

Appropriate correction is required.

8. Claim 5 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim must not depend from another multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claim has not been further treated on the merits.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not clear to what "a quantum bit string is sequentially supplied". Further it is not clear what "the amount of phase difference" is being compared with. As understood by the examiner, the objections and 112 rejections pertaining to claim 1 could be corrected by re-writing claim 1 as set forth below by the examiner. Claims 2-4 are rejected for inheriting the same informalities through their dependency from claim 1.

For the purpose of this examination, claim 1 has been interpreted as: "A quantum circuit characterized in that a quantum bit is represented by a polarization direction of light, a sequence of polarized light pulses representing a quantum bit string is sequentially supplied to the quantum circuit, and an amount of polarization rotation and phase difference applied to a certain light pulse are determined on the basis of a result of a measurement of polarization of a preceding input light pulse sequence, thus realizing a controlled-unitary transform."

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent

granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. Claims 1 and 4, as best understood, are rejected under 35 U.S.C. 102(e) as being anticipated by McGrew, U.S. Patent Application Publication Number 2003/0123051 A1 (hereafter McGrew).

13. As to claim 1, McGrew discloses a quantum circuit (it is noted that figures 3 and 4 represent a quantum circuit in that quantum bits (i.e. pulses of light) are being used) characterized in that a quantum bit is represented by a polarization direction of light (see paragraphs [0013]-[0015], [0030]-[0031], and [0055]-[0056]), a sequence of polarized light pulses (see figure 3, element 300 and figure 4, element 415 as well as paragraphs [0013]-[0015], [0030]-[0031], and [0055]-[0056]) representing a quantum bit string is sequentially supplied to the quantum circuit (see figures 3 and 4 as well as paragraphs [0013]-[0015], [0030]-[0031], and [0055]-[0056]), and an amount of polarization rotation and phase difference applied to a certain light pulse are determined on the basis of a result of a measurement of polarization of a preceding input light pulse sequence (see paragraphs [0013]-[0015], [0030]-[0031], and [0055]-[0056]), thus realizing a controlled-unitary transform (it is noted that if the above claimed circuit characteristics are met then the circuit must be performing the function of a controlled-unitary transform).

14. As to claim 4/1, McGrew discloses the quantum circuit according to claim 1, characterized in that in the light pulses representing the quantum bits, the number of photons included in one pulse is larger than 1 (see figures 2-4 and paragraphs [0013]-[0015], it is noted that a femto-second light pulse would produce more than one photon and you would not be able to "shape" only one photon as shown in figure 5 and disclosed in the specification of McGrew).

Allowable Subject Matter

15. Claims 2 and 3 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

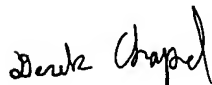
16. The following is a statement of reasons for the indication of allowable subject matter: Claim 2 would be allowable over the cited art of record, if rewritten in independent form including all of the limitations of the base claim and any intervening claims, for at least the reason that the cited art of record fails to teach or reasonably suggest a quantum circuit characterized in that the controlled-unitary transform causes the phase difference between polarization indicating a $|0\rangle$ state and polarization indicating a $|1\rangle$ state, as generally set forth in claim 1, the device including, in combination with the features recited in claim 1. Claim 3 depends from claim 2 and therefore would be allowable for at least the same reasons as claim 2.

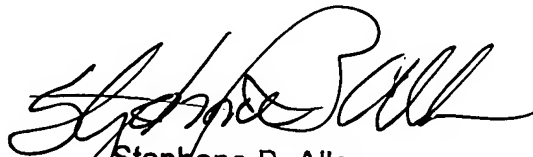
Conclusion

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek S. Chapel whose telephone number is 571-272-8042. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


DSC
1/18/2008


Stephone B. Allen
Supervisory Patent Examiner